

CLAIMS

What is claimed is:

1. A method for routing a data packet through an explicit path in a data communication network, comprising the steps of:
 - 5 receiving a data packet in a first network device;
 - determining whether said received data packet contains a global path identifier, and if so, performing a look-up function into a forwarding table using an index based on said global path identifier to determine the next hop to which said received data packet should be forwarded;
 - 10 calculating a new path identifier for said data packet as a function of said global path identifier and of the address of a port on the network device receiving said data packet; and
 - forwarding said data packet to said next hop.
- 15 2. The method according to claim 1, wherein two explicit paths that merge at a network node share a single same entry in said forwarding table in all downstream nodes.
- 20 3. The method according to claim 1, wherein said global path identifier is inserted in the optional field of an Internet Protocol ("IP") packet header.

4. The method according to claim 2, wherein said global path identifier is inserted in the optional field of an Internet Protocol ("IP") packet header.

5. The method according to claim 1, wherein said global path identifier is calculated by performing the bit-wise Exclusive-Or function of the Internet Protocol addresses of the nodes comprising said explicit path.

6. The method according to claim 2, wherein said global path identifier is calculated by performing the bit-wise Exclusive-Or function of the Internet Protocol addresses of the nodes comprising said explicit path.

7. The method according to claim 3, wherein said global path identifier is calculated by performing the bit-wise Exclusive-Or function of the Internet Protocol addresses of the nodes comprising said explicit path.

8. The method according to claim 4, wherein said global path identifier is calculated by performing the bit-wise Exclusive-Or function of the Internet Protocol addresses of the nodes comprising said explicit path.

9. A method for routing a data packet through a data communication network, comprising the steps of:

assigning a global path identifier to an explicit path through said data communication network;

inserting said global path identifier into said data packet; and
determining the next hop along said explicit path as a function of said global path
identifier.

5 10. The method according to claim 9, wherein said global path identifier is
inserted in the optional field of an Internet Protocol ("IP") packet header.

 11. The method according to claim 9, wherein said global path identifier is
assigned by performing the bit-wise Exclusive-Or function of the Internet Protocol
10 addresses of the nodes comprising said explicit path.

 12. The method according to claim 10, wherein said global path identifier is
assigned by performing the bit-wise Exclusive-Or function of the Internet Protocol
addresses of the nodes comprising said explicit path.

15 13. An apparatus for routing data packets through an explicit path in a data
communication network, comprising:

 means for receiving a data packet in a first network device;

 means for determining whether said received data packet contains a global path
20 identifier, and if so, performing a look-up function into a forwarding table using an index
based on said global path identifier to determine the next hop to which said received data
packet should be forwarded;

means for calculating a new path identifier for said data packet as a function of said global path identifier and of the address of a port on the network device receiving said data packet; and

means for forwarding said data packet to said next hop.

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14. The apparatus according to claim 13, wherein two explicit paths that merge at a network node share the same entry in said forwarding table in all downstream nodes.

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15. The apparatus according to claim 13, wherein said global path identifier is inserted in the optional field of an Internet Protocol ("IP") packet header.

16. The apparatus according to claim 14, wherein said global path identifier is inserted in the optional field of an Internet Protocol ("IP") packet header.

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17. The apparatus according to claim 13, wherein said global path identifier is calculated by performing the bit-wise Exclusive-Or function of the Internet Protocol addresses of the nodes comprising said explicit path.

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18. The apparatus according to claim 14, wherein said global path identifier is calculated by performing the bit-wise Exclusive-Or function of the Internet Protocol addresses of the nodes comprising said explicit path.

19. The apparatus according to claim 15, wherein said global path identifier is calculated by performing the bit-wise Exclusive-Or function of the Internet Protocol addresses of the nodes comprising said explicit path.

5 20. The apparatus according to claim 16, wherein said global path identifier is calculated by performing the bit-wise Exclusive-Or function of the Internet Protocol addresses of the nodes comprising said explicit path.

21. An apparatus for routing a data packet through a data communication
10 network, comprising:

means for assigning a global path identifier to an explicit path through said data communication network;

means for inserting said global path identifier into said data packet; and

15 means for determining the next hop along said explicit path as a function of said global path identifier.

22. The apparatus according to claim 21, wherein said global path identifier is inserted in the optional field of an Internet Protocol ("IP") packet header.

20 23. The apparatus according to claim 21, wherein said global path identifier is assigned by performing the bit-wise Exclusive-Or function of the Internet Protocol addresses of the nodes comprising said explicit path.

24. The apparatus according to claim 22, wherein said global path identifier is assigned by performing the bit-wise Exclusive-Or function of the Internet Protocol addresses of the nodes comprising said explicit path.

5 25. An apparatus for routing a data packet through an explicit path in a data communication network, comprising:

an input interface for receiving a data packet in a first network device;

packet examination logic for determining whether said received data packet contains a global path identifier, and if so, performing a look-up function into a forwarding table using an index based on said global path identifier to determine the next hop to which said received data packet should be forwarded;

new path identifier assignment logic which calculates a new path identifier for said data packet as a function of said global path identifier and of the address of a port on the network device receiving said data packet; and

15 packet forwarding logic for forwarding said data packet to said next hop.

26. The apparatus according to claim 25, wherein two explicit paths that merge at a network node share the same entry in said forwarding table in all downstream nodes.

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27. The apparatus according to claim 25, wherein said global path identifier is inserted in the optional field of an Internet Protocol ("IP") packet header.

28. The apparatus according to claim 26, wherein said global path identifier is inserted in the optional field of an Internet Protocol ("IP") packet header.

29. The apparatus according to claim 25, wherein said global path identifier is
5 calculated by performing the bit-wise Exclusive-Or function of the Internet Protocol addresses of the nodes comprising said explicit path.

30. The apparatus according to claim 26, wherein said global path identifier is calculated by performing the bit-wise Exclusive-Or function of the Internet Protocol
10 addresses of the nodes comprising said explicit path.

31. The apparatus according to claim 27, wherein said global path identifier is calculated by performing the bit-wise Exclusive-Or function of the Internet Protocol addresses of the nodes comprising said explicit path.
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32. The apparatus according to claim 28, wherein said global path identifier is calculated by performing the bit-wise Exclusive-Or function of the Internet Protocol addresses of the nodes comprising said explicit path.

20 33. An apparatus for routing a data packet through a data communication network, comprising:

global path identifier assignment circuitry for assigning a global path identifier to an explicit path through said data communication network;

global path identifier insertion circuitry for inserting said global path identifier into said data packet; and

next hop selection logic for selecting the next hop along said explicit path as a function of said global path identifier.

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34. The apparatus according to claim 33, wherein said global path identifier is inserted in the optional field of an Internet Protocol ("IP") packet header.

35. The apparatus according to claim 33, wherein said global path identifier is
10 assigned by performing the bit-wise Exclusive-Or function of the Internet Protocol addresses of the nodes comprising said explicit path.

36. The apparatus according to claim 34, wherein said global path identifier is
15 assigned by performing the bit-wise Exclusive-Or function of the Internet Protocol addresses of the nodes comprising said explicit path.

37. A program storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform a method for routing data packets through an explicit path in a data communication network, the method
20 comprising the steps of:

receiving a data packet in a first network device;

determining whether said received data packet contains a global path identifier, and if so, performing a look-up function into a forwarding table using an index based on

said global path identifier to determine the next hop to which said received data packet should be forwarded;

calculating a new path identifier for said data packet as a function of said global path identifier and of the address of a port on the network device receiving said data

5 packet; and

forwarding said data packet to said next hop.

38. A program storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform a method for routing data
10 packets through a data communication network, the method comprising the steps of:

assigning a global path identifier to an explicit path through said data communication network;

inserting said global path identifier into said data packet; and

determining the next hop along said explicit path as a function of said global path
15 identifier.